

CARDIAC ARREST DURING ELECTIVE ORTHOPEDIC SURGERY DUE TO MODERATE HYPOKALEMIA

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Abstract

We report the case of a perioperative cardiac arrest (ventricular fibrillation) of a patient undergoing elective orthopedic surgery due to moderate hypokalemia (serum potassium 2,8 mmol/l), whereas preoperative levels were normal. He was successfully resuscitated without neurological deficits and underwent postoperative intensive care monitoring. In times of increasing populations of elderly people presenting with considerable co-morbidity, clinicians should be aware of possible rapid changes of electrolyte levels resulting in perioperative cardiac arrhythmia.

Introduction

Perioperative cardiac arrhythmias are common complications, which, in most cases, do not affect hemodynamic stability and not always require antiarrhythmic therapy. Life-threatening arrhythmias with a sudden and unexpected onset during non-cardiac surgery are rare¹. Electrolyte imbalances such as a low serum potassium level may be one possible underlying cause². This condition is commonly defined as moderate (3-2.5 mmol/l) or severe hypokalemia (<2.5 mmol/l). Reasons for a hypokalemia in the perioperative setting may be previous medication, hypoglycemia (transcellular shift of potassium from serum into cells), and renal or gastrointestinal losses.

Case Report

We report the case of a 71-year-old man with a medical history of arterial hypertension, arterial obstructive disease, both without medication, borderline diabetes mellitus, treated with dietary measures, hypercholesterolemia, treated with simvastatin, alcohol and nicotine use, and no allergies. He was scheduled for amputation of his left lower thigh due to necrotic erysipelas and osteomyelitis for which he had been treated with clindamycin and levofloxacin. Further medication included palladon for pain therapy. Preoperative examination showed a 72 kg, 178 cm man. Non-invasive blood pressure was 143/85 mmHg, heart rate was 78/min and ECG revealed no cardiac pathology. Preoperative laboratory values included hemoglobin (Hb) of 5.8 mmol/l and serum potassium of 3.9 mmol/l.

The patient underwent anesthetic induction and endotracheal intubation with intravenous sufentanil (40 µg), propofol (100 mg) and rocuronium (50 mg) after implementation of standard monitoring. He was started on intravenous ketamine via infusion pump (5 mg/h) and received a bolus application of 25 mg for postoperative pain therapy. Anesthesia was maintained with 40%

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oxygen, 60% air, and sevoflurane (0.7-1.3% end-tidal concentration). Surgery then commenced and was uneventful. An arterial blood sample to assess the blood loss revealed anemia (Hb 5.0 mmol/l) and moderate hypokalemia (serum potassium 2.9 mmol/l).

About one minute later, the ECG monitor alarmed and displayed an artefact-like pattern that frequently occurs when surgeons use electrocoagulation devices, whereas this was not the case. The immediate check of the ECG electrodes revealed no mislocation, and the palpation of both carotid arteries revealed pulselessness. Surgery was abandoned, and chest compressions were performed immediately. The first defibrillation had no effect, whereas the second resulted in asystole. After total administration of 2 mg adrenaline (aliquots of 1 mg each), return of spontaneous circulation (ROSC) was evident by palpable pulses of both carotid arteries and the ECG showed a heart rate of 87/min. The first available BP was 160/90 mmHg. The time from onset of ventricular fibrillation to ROSC was 9 minutes. Surgery was then completed, and the patient was transferred to the intensive care unit, where he received correction of hypokalemia and anemia.

He was successfully weaned off the ventilator and extubated 4 hours after ROSC. Subsequent neurological examination revealed no deficits. Laboratory measures, ECG, echocardiography and chest radiography did not show evidence of cardiac ischemia, valvular pathology or pulmonary embolism. After three further days of monitoring, the patient was discharged to the regular ward.

References

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Discussion

In this patient, there was no high-risk medication for a hypokalemia such as diuretics or insulin, whereas his antibiotic medication have rarely been reported to cause electrolyte imbalances².

Other possible causes for a perioperative cardiac arrest may be iatrogenic by anesthetic agents or insufficient pain therapy.

However, the analysis of five prospective cohort studies, covering 6253 non-cardiac surgery patients, revealed postoperative cardiac arrhythmia in 7.84%³. The occurrence of atrial fibrillation was by far the most frequent type of arrhythmia (4.41%), whereas VF was a very rare complication (0.02%).

In another large review, the overall frequency of perioperative cardiac arrest was 4,3 per 10.000⁴. Most arrests were not due to anesthesia-related causes, and most patients experiencing anesthesia-related arrest survived to hospital discharge.

Conclusion

We conclude that ventricular fibrillation and cardiac arrest may suddenly occur perioperatively probably due to unrecognized moderate electrolyte imbalances even patients presenting with a lower risk profile. In a future demography of increasing age and morbidity it may hardly be possible to identify this kind of risk factor in any patients scheduled for surgery. Therefore, clinicians may be confronted more frequently with similar complications requiring appropriate attention and immediate response measures for successful management.

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